



High Voltage Test Equipment

Product Catalogue

High Voltage Test Equipment

Innovative, proven, economic –
HV Testing from b2 High Voltage

HVA

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Test Systems

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HVA 60

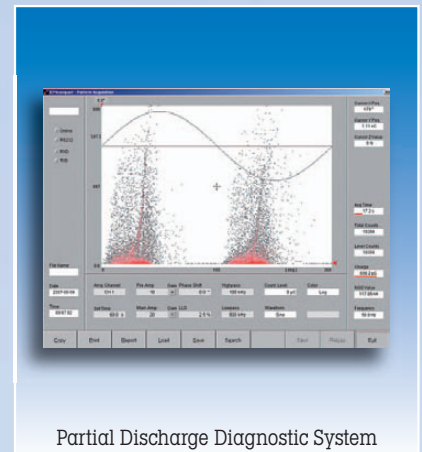
HVA 30



Tan Delta Diagnostic Systems



Breakdown Analyzer BA75



Partial Discharge Diagnostic System

VLF High Voltage Test Equipment – the HVA-Series

The most sold, advanced, safest, smallest and lightest – a class of its own!

b2 electronic GmbH is a globally represented company based in Austria specialising in high voltage test and diagnostic products for the world's electricity distribution network companies and their supporting industries such as generation and construction.

b2 electronic incorporates several decades of experience in developing

and producing high voltage test sets and diagnostic systems for MV cables. Several hundred "Very Low Frequency" (VLF – 0.1 Hz) test sets sold into the global market provide us with an impressive reference.

b2 electronic is the most successful European manufacturer of sine wave VLF test sets by a significant margin.

More efficiency through VLF

It is well known that DC testing of aged extruded cable such as XLPE and EPR is potentially damaging to the cable insulation, causing premature failure of the cable under service conditions, thus leading to major costs and CML (customer minutes lost).

In addition, DC "proof" or "hipot" testing has been found to be largely ineffective in detecting serious defects in cables. Since this is a primary objective of any hipot test, and also due to the negative side effects of DC, VLF AC waveform testing is now recommended by almost all new cable testing policies and standards.

Acceptance or maintenance hipot / proof testing using VLF high voltage sinusoidal AC allows the operator to efficiently detect serious cable insulation defects before they result in an in-service failure, without affecting those healthy sections of the cable that still have remaining service life.

Very low frequency (VLF) AC (0.1 Hz) voltage testing is now the recommended and required method of test for medium-voltage cables. (e.g. CENELEC HD620 S1, IEEE 400.2, VDE 0276, ...)

HVA: VLF Testing – fully equipped!

The HVA series are the most advanced HV VLF AC/DC test sets in the world. They are the lightest and most compact instruments of their kind. The HVA models also have the highest power to weight ratio of any comparable units.

Apart from their variable frequency VLF output, the operator can also select dual polarity DC and cable jacket or sheath testing output modes.

The applied test voltage, current, capacitance, resistance and time are both displayed and recorded.

The instruments are easily programmable allowing the operator to set up or select test sequences in either automatic or manual mode. To assist the operator, the instruments will automatically calculate the optimum frequency to be selected for larger loads.

Their load independent, symmetrical output waveform avoids the potentially destructive space charge effects caused by DC polarization that occur in aged extruded cables such as XLPE / PE / EPR, causing them to fail prematurely after exposure to conventional high voltage DC or from a test instrument with large non-symmetrical output waveforms.

Should a breakdown occur during testing, the actual voltage at which it occurred is displayed and recorded. If cable burning (fault conditioning) mode is activated, the fault resistance can be conditioned to allow easier and less stressful fault location techniques to be applied.

The test results are stored in the instrument's internal memory allowing easy retrieval and download to a PC via cable or via USB memory stick.

HVA advantages at a glance

- VLF (0.1Hz), DC ($\pm$), Cable Fault Conditioning (Burning), and Sheath/Jacket Testing modes all included.
- Vacuum Bottle Test
- Fully automatic or manual cable test sequences complying with international standards & guides such as IEEE 400.2, VDE 0276, CENELEC, HD620 S1, NEN 3620, SANS 10198 and IEC 60060-3 (draft).
- True symmetrical sinusoidal, load independent output waveform across the full load range.
- Unique and essential real-time display of actual output waveform.
- Large output load capability.
- Automatic and integrated, load capacitance measurement with optimum frequency selection.
- RMS digital metering of current and voltage and measuring of resistance and capacitance.
- Storage of test results for later retrieval or download to a PC/Laptop.
- No oil filled devices, or arcing contactors that require routine maintenance.
- Short circuit protected with active arc management regulation that avoids the tripping of conventional HV test equipment when a dielectric failure occurs.
- Upgradeable to a Cable Diagnostic System, such as Tan Delta (TD) and Partial Discharge.



HVA safety features

- Short circuit protected
- Solid and fully integrated discharge circuit to safely ground the DUT (Device Under Test) after testing
- Status display of all important safety functions and messages
- 12kV feedback protection (HVA30, HVA60, HVA90)
- Safe, easy to use operation with emergency off and key switch lock-out
- Zero start interlock
- Zero voltage switching

HVA Applications

- Cables: XLPE, PE, EPR, PILC etc.
- Capacitors
- Switchgear
- Transformers
- Rotating Machines (IEEE 433)
- Insulators
- Bushings

HVA

- VLF
- DC
- Jacket/Sheath
- Fault conditioning



HVA30

**Portable and universal
VLF High Voltage Test Set**

- Large output load capability up to 12 μF *

The ultra light HVA30 Test System with only 19.5 kg is capable of testing cables up to 1,500 m (0.5 μF at 0.1 Hz and 23 kV rms).

The variable output frequency allows the testing of even much longer cables. At 2.5 μF – 0.01 Hz and 23 kV rms a length of approx. 8,000 m can be tested (see technical data).



HVA30-5

**Portable and high power
VLF High Voltage Test Set**

- Large output load capability up to 15 μF *

The high power HVA30-5 Test System is capable of testing cables up to 10,000m (3.4 μF at 0.1 Hz and 23 kV rms).

The variable output frequency allows the testing of even much longer cables. At 15 μF – 0.02 Hz and 23 kV rms a length of approx. 45,000 m can be tested (see technical data).



HVA60

**Portable and universal
VLF High Voltage Test Set**

- Large output load capability up to 10 μF *

The high power HVA60 Test System is capable of testing cables up to 3,000 m (1 μF at 0.1 Hz and 44 kV rms).

The variable output frequency allows the testing of even much longer cables. At 5 μF – 0.01 Hz and 44 kV rms a length of approx. 15,000 m can be tested (see technical data).



HVA90

**Compact and universal
VLF High Voltage Test Set**

- Large output load capability up to 10 μF *

The high power HVA90 Test System is capable of testing cables up to 3,300m (1 μF at 0.1 Hz and 64 kV rms).

The variable output frequency allows the testing of even much longer cables. At 5 μF – 0.01 Hz and 64 kV rms a length of approx. 33,000 m can be tested (see technical data).

* at lower frequency and voltage

Type		HVA30	HVA30-5	HVA60	HVA90
Article number		SH0201	SH0206	SH0203	SH0209
Input Voltage		110 - 230 V 50 / 60 Hz (400 VA)	110 - 240 V 50 / 60 Hz (1.5 kVA)	110 - 240 V 50 / 60Hz (1.5 kVA)	210 - 265 V 50 Hz (3.0 kVA)
Output Voltage	Sinusoidal	0 - 33 kV peak, 23 kV rms	0 - 33 kV peak, 23 kV rms	0 - 62 kV peak, 44 kV rms	0 - 90kV peak, 64 kV rms
	DC	± 0 - 30 kV	± 0 - 30 kV	± 0 - 60 kV	± 0 - 90 kV
	Squarewave	30 kV	30 kV	60 kV	90 kV
	Accuracy	± 1 %	± 1 %	± 1 %	± 1 %
	Resolution	0.1 kV	0.1 kV	0.1 kV	0.1 kV
Output Current		0 - 15 mA (Resolution 1 µA) Accuracy: ± 1 %	0 - 85 mA (Resolution 1 µA) Accuracy: ± 1 %	0 - 40 mA (Resolution 1 µA) Accuracy: ± 1 %	0 - 60 mA (Resolution 1 µA) Accuracy: ± 1 %
Resistance Range		0.1 MΩ 5 GΩ			
Output Frequency		0.01 ... 0.1 Hz in steps of 0.01 Hz (default 0.1 Hz) – auto frequency selection			
Output Load		0.5 µF @ 0.1 Hz @ 23 kV rms (Approx 1.5 km of cable)* 1.0 µF @ 0.05 Hz @ 23 kV rms (Approx 3 km of cable)* 2.5 µF @ 0.02 Hz @ 23 kV rms (Approx 8 km of cable)* 12.0 µF maximum Capacitance	3.4 µF @ 0.1 Hz @ 23 kV rms (Approx 11 km of cable) 5 µF @ 0.1 Hz @ 19 kV rms (Approx 17 km of cable)* 6.25 µF @ 0.08 Hz @ 19 kV rms (Approx 20 km of cable)* 10 µF @ 0.05 Hz @ 19 kV rms (Approx 33 km of cable)* 15 µF maximum Capacitance	1.0 µF @ 0.1 Hz @ 44 kV rms (Approx 3 km of cable)* 2.0 µF @ 0.05 Hz @ 44 kV rms (Approx 6 km of cable)* 5.0 µF @ 0.02 Hz @ 44 kV rms (Approx 15.5 km of cable)* 10 µF Maximum Capacitance	1.0 µF @ 0.1 Hz @ 64 kV rms (Approx 3.3 km of cable)* 1.2 µF @ 0.1 Hz @ 57 kV rms (Approx 3.6 km of cable)* 10 µF @ 0.01 Hz @ 64 kV rms (Approx 33 km of cable)* 11 µF Maximum Capacitance
Output Modes		AC (VLF) Symmetrical and load independent across full range, DC (plus or negative polarity), Burn / Fault Condition or Fault Trip Mode, Jacket / Sheath Testing			
Safety		50 Hz 12 kV Feedback Protection	–	50 Hz 12 kV Feedback Protection	50 Hz 12 kV Feedback Protection
Memory		50 Test Records Stored			
Metering		Voltage and Current (True rms and/or peak), Capacitance, Resistance, Time, Flashover Voltage			
Duty		Continuous! No thermal limitation for operating time.			
HV Cable		4.5 m (15') with Alligator clamps on end (other options available on request)	4.5 m (15') with Alligator clamps on end (other options available on request)	5 m (15') with Alligator clamps on end (other options available on request)	7.5 m (15') with Alligator clamps on end (other options available on request)
Software		"HVA Control Center"			
Computer interfaces	RS232	●	●	●	●
	USB	Flash Drive	Optional	Optional	Optional
Environmental conditions		Storage: -25 °C to +70 °C, Operating: -5 °C to +45 °C			
Dimensions L x W x H		430 x 250 x 360 mm	450 x 340 x 520 mm (Excludes Carry Handle)	450 x 340 x 520 mm	545 x 445 x 610 mm (Excludes Carry Handle), also as 19" version available
Weight		19,5 kg	45 kg	57 kg	127 kg
Upgrades (Optional)		Tan Delta System TD30 and Partial Discharge System PD30	Tan Delta System TD30 and Partial Discharge System PD30	Tan Delta System TD60 and Partial Discharge System PD60	Partial Discharge System PD90
* Based on a typical cable: 300 pF/m					

Tan Delta Test System

High Voltage Cable Diagnostic Systems TD30 and TD60

TD

- Tan Delta
- Ultra light and compact design
- Easy handling
- Testing and diagnostics simultaneously
- Transfer of test results via Bluetooth
- Fully automatic reporting
- No complicated wiring

Tan Delta measurement is a proven, simple and reliable test method for confirming the dielectric condition of cables or other electrical plant and infrastructure. "Water-tree" damaged cables can be easily and clearly be identified.

The ease of use, low weight and the compact elegant design is truly impressive. The HVA series vlf test sets serve as the ideal high voltage source for these TD units.

Applications

The TD30 and TD60 provide the testing and commissioning engineer with versatile high voltage tan delta measurement systems suitable for testing XLPE, PE, EPR and PILC cables plus other electrical equipment such as capacitors, switchgear, transformers and rotating machines.

Description

Tan Delta (also referred to as "Power Factor") is the ratio of the Resistive Power versus the Capacitive Power dissipated in the dielectric material during testing or when in actual service. It is possibly the single most reliable and sensitive measurement of the quality of the insulation medium available.

Benefits

TD testing enables the cable test engineer to detect insulation defects before the cable fails in service. It is far more informative than pressure testing alone and adds even more value to the market leading HVA series AC test sets.

As TD is an AC test all the benefits of VLF testing are inherent and the test is very quick as there are no DC charging times, or problems with dielectric absorption etc.

The Tan Delta of the test object can be measured quickly and the results stored, thus providing a "signature" of the cable being tested.

This enables the cables engineer to make a routine test and combine this diagnostic test with the normal over voltage pressure "testing" to provide a truly "smart" VLF test. When carried out at fixed intervals TD testing can be the basis of predictive maintenance program for your HV cables.

Design

b2 electronic produce two models, the TD30 for measurements up to max voltage of 23 kV rms (33 kV peak), and the TD60 for measurements up to a max voltage of 44 kV rms (or 62 kV peak).

The system is battery powered and directly connected to an HVA series of VLF test sets. The TD30/TD60 use standard C type alkaline batteries which last for 10 hours thus providing the capacity for many tests.

The TD30/TD60 are supplied with 5/7 metres of test lead which is terminated to suit the HVA30/HVA60 units. It also comes with complete operating software which gives an immediate and comprehensive picture of the tan delta measurement together with a real time waveform display of the HV test voltage and current.

The data transmission to a laptop PC is via Bluetooth™ wireless communication thus eliminating data cables or fibre optic links, minimising the connection time and possible operator errors.

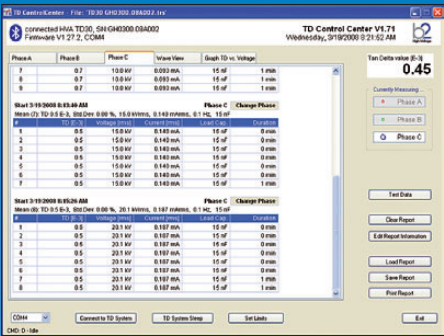


Transportbox TD30



Transportbox TD60

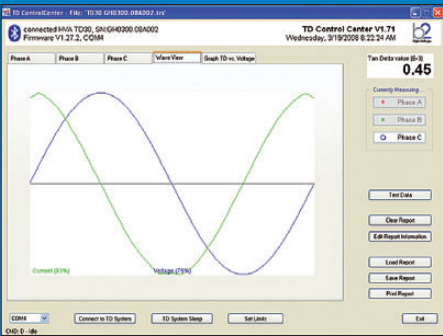
TD Analysis Software



The diagnostic report of the analysing software "TD Control Centre" presents a comprehensive and clear record of the individual measurements made during a TD test cycle.

An easy to interpret graphical display of the values offers a fast and accurate assessment of the dielectric condition of the cable.

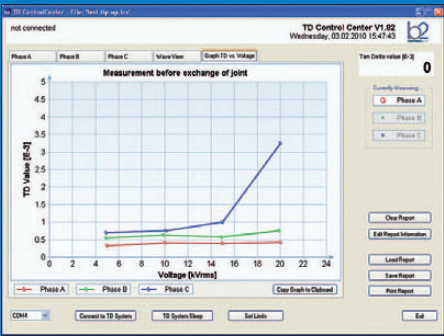
Output Wave Screen



In the waveform screen both the output voltage and output current are displayed simultaneously in real time.

In addition to the status of the voltage and current waveforms, the Tan Delta value is also displayed.

Graph - TD and Voltage



In the TD graph the Tan Delta values at the corresponding voltage levels are displayed.

The TD values plotted against the HV test voltage values give an indication of the specific problems the cable insulation has.

Automatic Report Writer

At the click of your mouse the full Tan Delta report with all values, mean values and TD profile graph is printed.

Type		TD30	TD60
Article number		SH0207	SH0208
Input Voltage		2 type "C" alkaline cells or NiMH batteries	
Operating Voltage	Sinusoidal	1 - 23 kV rms	1- 44 kV rms
	Frequency	0.1 Hz	0.1 Hz
Voltage measurement	Resolution	0.1 kV rms	
	Accuracy	1 % of reading	
Current measurement	Resolution	1µA rms	
	Accuracy	1 % of reading	
Tan delta measurement	Resolution	1 x 10 ⁻⁵	
	Accuracy	± 1 x 10 ⁻⁴ (load > 15 nF), ± 3 x 10 ⁻⁴ (load < 15 nF)	
Load range		Standard: 15 nF to 5 µF; Lower Accuracy: 1 nF to 15 nF	
Weight		3 kg (7 lbs)	5 kg (11 lbs)
Dimensions		240 mm long x 80 mm in diameter (9.5" long x 3.2" in diameter)	450 mm long x 120 mm in diameter (18" long x 5" in diameter)
Computer interface		Bluetooth™	
Delivery includes		HV connection cable, transit case, Bluetooth™ Dongle, Earth cable, TD Control Center Software, Operating manual	
Standards		EMC: IEC6100-4-2, IEC6100-4-4, EN55011; Safety: EN60950, EN50191, EN61010-1	
Environmental conditions		Storage: -25 °C to +70 °C, Operating: -5 °C bis +45 °C; Humidity max. 80 % R.H. (non-condensing)	

Partial Discharge Detection and Location

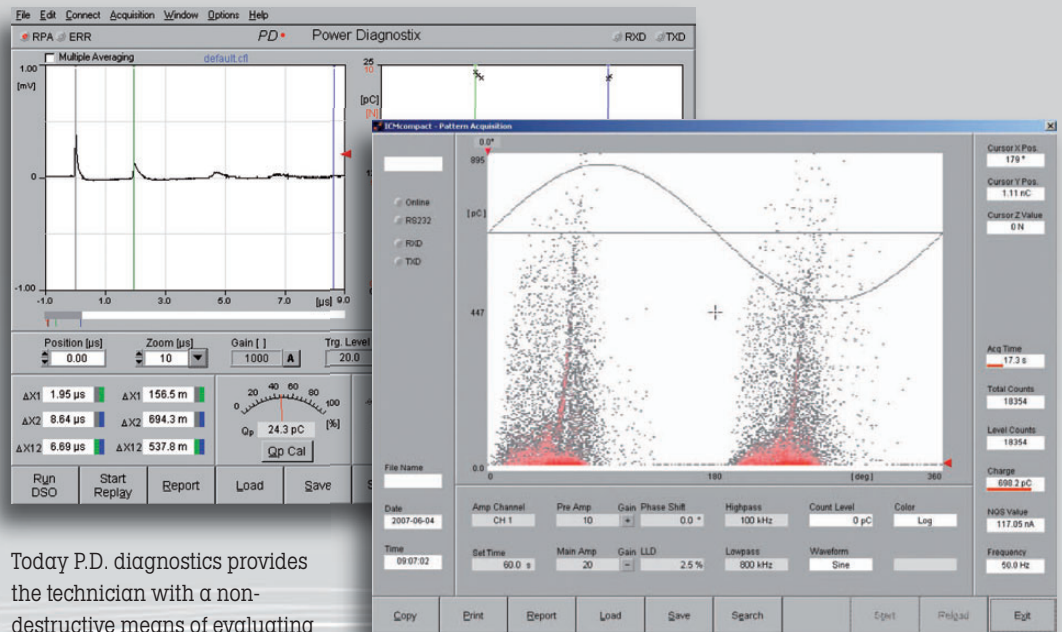
PD30, PD60 and PD90

PD

- Comprehensive PC software
- Complete cable length display with PD activities
- High noise reduction
- PD location – PD map
- PD magnitude

Partial Discharge measurements have traditionally been carried out in a noise free environment such as a Faraday Cage. In the past this made on site P.D. measurement impossible.

With the advent of modern electronics and digital filtering, it is now possible to effectively carry out Partial Discharge measurements in an electrical substation.



Today P.D. diagnostics provides the technician with a non-destructive means of evaluating the cable and the accessories.

By locating these P.D. sites promptly, corrective measures can be taken before the cable fails thus avoiding power failures and customer minutes lost.

P.D. Detection includes the following:

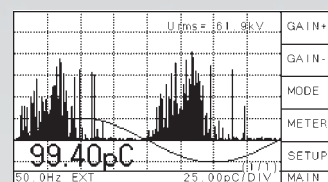
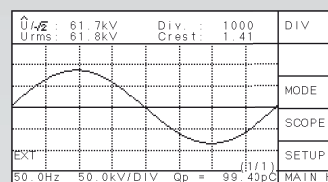
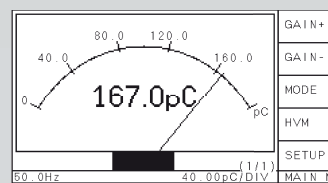
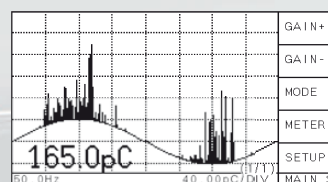
- PD discharge metering
- Phase position of discharges indicated
- Scope display – sine wave superimposed
- PD mapping – actual locations of partial discharges.
- Locates sites using TDR principles
- Voltage measurement circuit

The software will record:

- pC magnitude over time
- Plot the P.D. map (location)
- Plot the P.D. intensity

The following parameters are recorded:

- Calibration Pulse and End Detection (in accordance with IEC60270)
- Background Noise
- PDIV (Partial Discharge Inception Voltage)
- Partial Discharge level at 1.7 U₀
- PDEV Partial Discharge Extinction Voltage



Type		PD30	PD60	PD90
HV Filter and Coupling Capacitor	Rated Voltage kV peak	33	62	90
	Rated Current (amps)		1	
	Filter Capacitance (nF)	20	10	10
	Dimension L x H x B (mm)	550 x 680 x 250	550 x 800 x 360	550 x 900 x 360
	Weight (kg)	30	45	55
Calibrator	Display pC		100 to 10.000	
	Weight (kg)		1	
Partial Discharge Detector	Display / Resolution (Pixel)		Backlit LCD / 128 x 240	
	Input Impedance		10 k Ω / 50 pF	
	Lower Cut-off (kHz)		40, 80 or 100	
	Upper Cut-off (kHz)		250, 600 or 800	
	Synchronisation (Hz)		0.1, 0.05, 0.02	
	Auto Zero Crossing		Yes	
	Triggered Noise		Manual and Auto	
	Dimensions L x H x B (mm)		250 x 150 x 300	
	Weight (kg)		3	
Software	Microsoft Windows		XP / Windows7	
	PD Mapping and Location		Yes	

Two different models are available, one using a stand-alone independent PD detector/-display unit, or the alternative version where signals are displayed and evaluated only on a PC via a Bluetooth connection.

The software automatically scans, records, edits, replays and allows the printing of the Partial Discharge screens.

Zoom and cursor functions are provided for precision PD location and PD mapping.



Portable and laboratory based Oil Test Sets

Breakdown Analyzer BA75 and BA100

BA

Usability

- Low weight and compact design
- Ultra bright colour display
- Internal battery, external 12V Supply

Technology

- Ultra fast switch-off time ($< 5\mu\text{s}$)
- Direct measurement of output voltage
- Measurement of silicone oils

Communications

- Bluetooth connection
- USB flash drive
- Intuitive control concept



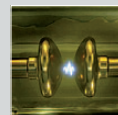
Ultra Bright Colour Display

The 2,8" colour display is very bright and offers optimal readability and mobility.

Weight and Dimensions

The BA Breakdown Analyzer is the smallest and lightest portable oil test set of its rating available.

BA Technology



Ultra fast switch-off time at flash over ($< 5\mu\text{s}$). Direct measurement of output voltage Measurement of silicon oils.

Power supply

Besides main supply, the BA Series has a built-in battery pack and an external 12 V power supply.

Direct evaluation



The built-in printer offer a direct evaluation and reporting of the results.

Bluetooth / USB Flash Drive



Communications via Bluetooth and/or USB Flash Drive possible.

Type	BA75	BA100
Article number	SB0001	SB0005
Output Voltage	Up to 75 kV rms symetrical	Up to 100 kV rms symetrical
Voltage measurement accuracy	0 ... 75 kV } ±1 kV	
Voltage rise rate	0.5...10 kV/s	
Resolution (displayed)	0.1 kV	
Power supply	85 V ... 264 V (47 Hz ... 63 Hz) and 12 V external supply	
Power consumption	60 VA	75 VA
Internal rechargeable battery	1 x 12V / 7,2Ah	
Switch-off time on flashover	< 5 µs	
Measurement of oil temperature	0 ... 100 °C	
Temperature resolution	1 °C	
Display	2,8" colour (ultra bright)	
Selectable programs	VDE370-5/96, ÖVE EN60156, IEC 60156/95, ASTM1816-04-1, ASTM1816-04-2, ASTM877-02A, ASTM877-02B, AS1767.2.1, BS EN60156, NEN 10 156, NF EN60156, PA SEV EN60156, SABS EN60156, UNE EN60156, single measurement, other standards possible	
Customer-specific programs	unlimited	
PC Software "BA75 Control Center"	included	
Printer	graphical output 44 mm (dot matrix)	
Interface	Bluetooth	
USB	USB memory stick	
Operating temperature	-5° ... 45 °C	
Storage temperature	-20 ... +60 °C	
Relative humidity	Non condensing	
Dimensions W x H x D	430 x 280 x 250 mm	521 x 343 x 300 mm
Weight	22 kg including batteries	32 kg including batteries
Delivery includes	Breakdown Analyzer BA, Lifting stick for magnetic stirrer, Printer, Magnetic oil stirrer, Setting gauge 2.5 mm IEC, User manual	

Scope of supply

Article		number	
for		BA75	BA100
Test vessel IEC 60 156 with cover and electrodes		GB0050	GB0058
Test vessel IEC 60 156 with cover and electrodes		GB0051	GB0055
Test vessel ASTM D 877 with cover and electrodes		GB0052	GB0056
Test vessel ASTM D 1816-04 with cover and electrodes		GB0053	GB0057
Transport bag		VKR0011	VKR0014
Dust cover		VKR0016	VKR0017
Rugged Transport box		VKR0010	VKR0015

Article	number
for	BA75 and BA100
Setting gauge 1 or 2 or 2,5 or 4 or 5 mm	GB0110-0114
Ring nut wrench (test vessel)	GB0106
Lead for connecting vehicle cigarette lighter socket (12V, 5m)	GB0120
Ribbon cartridge for printer	GB0103
Paper roll for printer	GB0102



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The experts in high voltage testing

Electricity means energy security – anytime and anywhere:
Health, transport, security, manufacturing, telecommunications,
infrastructure, logistics, research and entertainment –
without continuous and failure resistant energy supplies
around the clock, our modern civilization is hardly imaginable.

With our high voltage test equipment products we support the electrical
utilities maintenance of their electrical networks, so that whenever and
wherever the energy is required it will be delivered.

From portable High Voltage Test Systems to insulating oil testers –
our test technology product solutions are first choice with customers
worldwide who need to ensure a fail-safe power supply.



DHV1.200 Rev01